

(PCT Article 36 and Rule 70)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/012297

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-27 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* 1-31 _____ received by this Authority on 22.08.2005 with telefax
- nos.* _____ received by this Authority on _____
- ☒ the drawings:
- sheets 1/7-7/7 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1.	Statement		
	Novelty (N)	Claims <u>1-31</u>	YES
		Claims _____	NO
	Inventive step (IS)	Claims <u>1-31</u>	YES
		Claims _____	NO
	Industrial applicability (IA)	Claims <u>1-31</u>	YES
		Claims _____	NO
2.	Citations and explanations (Rule 70.7)		
	This report makes reference to the following documents:		
	D1: DE 101 55 419		
	D2: US 4 289 895		
1.	<p>Document D1 is regarded as the closest prior art and discloses (the references in parentheses are to that document):</p> <p>a tower reactor comprising reaction zones for simultaneous esterification and/or transesterification, as well as pre-condensation, the individual reaction zones being interconnected and united in the tower reactor.</p> <p>The subject matter of independent claim 1 differs from the above in that:</p> <ul style="list-style-type: none"> the tower reactor is designed in its top third as a hydrocyclone (2) with an attached heat exchanger (5), and comprises a feed pipe (3) for the paste, slurry and/or liquid raw material mixture, the zone of the tower reactor below the 		

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	<p>hydrocyclone (2) is designed in the form of a downdraft cascade (7);</p> <ul style="list-style-type: none">• the cascade (7) communicates via a pipe with the lower part of the tower reactor, which is designed in the form of a single-stage or multiple-stage falling-film zone (9) with pre-expansion (8). <p>2. The subject matter of claim 1 is thus novel (PCT Article 33(2)).</p> <p>The present invention can therefore be considered to address the problem of simplifying a tower reactor.</p> <p>3. The solution to this problem, as proposed in claim 1 of the present application, involves an inventive step (PCT Article 33(3)) for the following reasons. Document D1 does not describe the solution according to the application. Document D2 describes a device with three zones (40, 60a, 60b). Zone (40) is not integrated in the tower reactor. For this reason, pipes are required in the device to convey liquid from zone (40) to zone (60a). Document D2 thus neither describes nor suggests the solution according to the application.</p> <p>4. Claims 2-30 are dependent on claim 1 and thus likewise meet the PCT novelty and inventive step requirements.</p>

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5.	Claim 31 is novel and inventive because the tower reactor to which it relates is novel and inventive.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

6. As explained below, some of the features in the device claims 14, 18 and 21 relate to a process for using the device and not to the definition of the device in terms of its technical features. The intended restrictions are therefore unclear from the claim, which thus does not comply with PCT Article 6.
7. In claim 14, the features, "owing to the pressure loss in the slot, a constant filling level is generated above the pipes", "the slots are designed in such a way that viscosity variations do not cause any changes in filling level, but rather a change in filling level in relation to liquid throughput", are process features. They do not describe the device *per se*, but rather what happens when the device is used.
8. In claim 18, the feature, "a total wetting depending on product viscosity", is a process feature. It does not describe the device *per se*, but rather what happens when the device is used.
9. In claim 21, the feature, "with organic heating medium in vapour form", is a process feature. The feature, "with organic heating medium in vapour form", does not describe the device *per se*. It describes the device when the heating medium is conveyed through the pipe and heated until it is in vapour form.